

California State Water Resources Control Board
Leaking Underground Fuel Tank (LUFT)
Guidance Manual



Update on the LUFT
Manual
2012 SAM Fall Forum

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LUFT Manual Update

Revised Manual released the week of September 17, 2012!

Incorporates public comments received in August-November 2010

Includes guidance on the Low-Threat Closure Policy

Low-Threat Closure Policy and the LUFT Manual



- Annual review to determine whether the site meets the Low-Threat Closure Policy criteria.
- Resolution No. 92-49 does not require that the requisite level of water quality be met at the time of case closure
- Attaining background water quality is not feasible, establishing an alternate level of water quality not to exceed that prescribed in the applicable Basin Plan is appropriate

Fate and Transport of Petroleum in the Subsurface



- Detailed discussion how petroleum migrates and weathers in the subsurface and why
- Physical and chemical properties
- Composition of petroleum products
 - Gasoline
 - Middle Distillates
 - Lubricating Oils

Fate and Transport

Average Composition of Gas and Diesel

Component	Fresh Gasoline (%)	Fresh Diesel (%)
Benzene	2.0 (<i>max 2.5</i>)	0.03 (<i>max 0.1</i>)
Toluene	8.1 (<i>max 12</i>)	0.2 (<i>max 0.7</i>)
Ethylbenzene	1.7 (<i>max 2</i>)	0.07 (<i>max 0.2</i>)
Xylenes	9.0 (<i>max 11</i>)	0.5 (<i>max 0.6</i>)
Naphthalene	0.25 (<i>max 0.36</i>)	0.26 (<i>max 0.8</i>)
<i>n</i> -Hexane	2.4 (<i>max 3.2</i>)	Not Measured
2-Methylnaphthalene	0.18 (<i>max 0.29</i>)	0.89 (<i>max 1.5</i>)
High Molecular Weight PAHs	Not Measured	<0.01

Potter and Simmons (TPH Criteria Working Group Vol. 2)
1998

Fate and Transport

Average Composition of Gas and Diesel

Component	Fresh Gasoline (%)	Fresh Diesel (%)
<i>Aliphatics</i>		
C5-C6	21	0
>C6-C8	22	0
>C8-C10	9	2
>C10-C12	3	7
>C12-C16	0	35
>C16-C21	0	34
>C21-C32	0	0

TPH fractions are values for fresh “generic” products ODEQ; 2003.

Fate and Transport

Average Composition of Gas and Diesel

Component	Fresh Gasoline (%)	Fresh Diesel (%)
<i>Aromatics</i>		
>C8-C10	13	0.43
>C10-C12	2.3	0.74
>C12-C16	0	8
>C16-C21	0	12
>C21-C32	0	0
>C8-C10	13	0.43
>C10-C12	2.3	0.74
>C12-C16	0	8

TPH fractions are values for fresh “generic” products ODEQ; 2003. Revised to include the trimethylbenzenes [TMBs] in the C8-C10 aromatics fraction.

Fate and Transport

Representative Properties of Selected Constituents

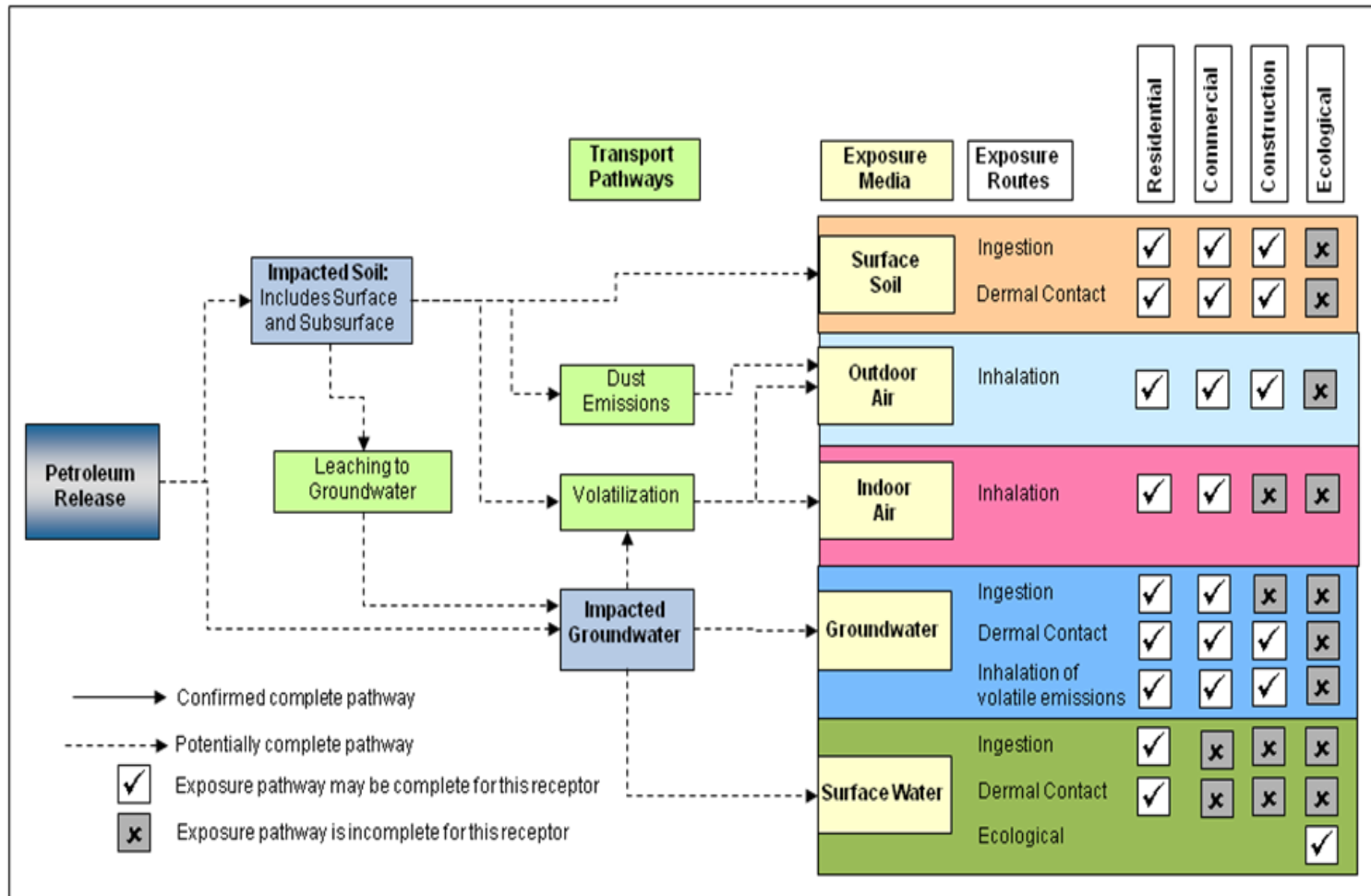
	Molecular Weight (g/mol)	Density ⁽¹⁾ (g/cm ³)	Dynamic Viscosity ⁽¹⁾ (cp)	Pure-Compound / TPH Fraction / Product Mixture Water Solubility ^(1,6) (mg/L)	Pure-Compound Vapor Pressure ⁽¹⁾ (mm Hg)	Henry's Law Constant ⁽²⁾	Log K _{oc}
Benzene	78.1	0.88	0.6468	1.78 E+03	76	0.23	1.8
Toluene	92.1	0.87	0.58	5.15 E+02	22	0.27	2.3
Ethylbenzene	106.2	0.87	0.6468	1.52 E+02	7	0.32	2.6
Xylenes	106	0.87	0.68	1.8 E+02	9	0.28	2.6
<i>n</i> -Hexane	86	0.7		1.8 E+01	121	5	2.9
Naphthalene	128	1.5		3.1E+01/ 1.10E+02	0.08	0.02	3.3
MTBE	88.15	0.74	---	5E+04	251	0.024	1.1
TBA	74.12	0.79		Infinite	41	0.0005	1.6
Water	18	0.998	1.14				

Conceptual Site Model



- Requirement for Policy!
- Describes all the receptors & exposure routes specific to LUFT Sites
- Policy focus:
 - Groundwater from drinking water wells
 - Vapors in buildings
 - Contact with near surface soil
 - Vapors in the outdoor environment.

Conceptual Site Model



Site Assessment



New ways of approaching Site Assessment

- **Shallow soil concentrations**
 - 0 to 5-foot depth interval
 - >5 to 10-foot depth interval
- **% Oxygen within shallow soil**
- **Length of plume & location of the nearby water supply wells for separation distance**

Site Assessment



- Groundwater Sampling:
 - Goal is to produce low-turbidity samples
 - ✦ Use pre-pack screens for open boring samples
 - ✦ Redevelop monitoring wells
 - ✦ Use low-flow purge and sampling

Laboratory Analysis and Methods



- More analytes in the Manual than Policy
- TPH used as for site characterization tool
- If TPH is used for risk, use a “fractionated” analysis
- SGC to isolate the petroleum hydrocarbons from the biodegradation metabolites
- Recommendations for implementing turbidity- and sheen-reduction measures at the lab

Risk Evaluation and Management

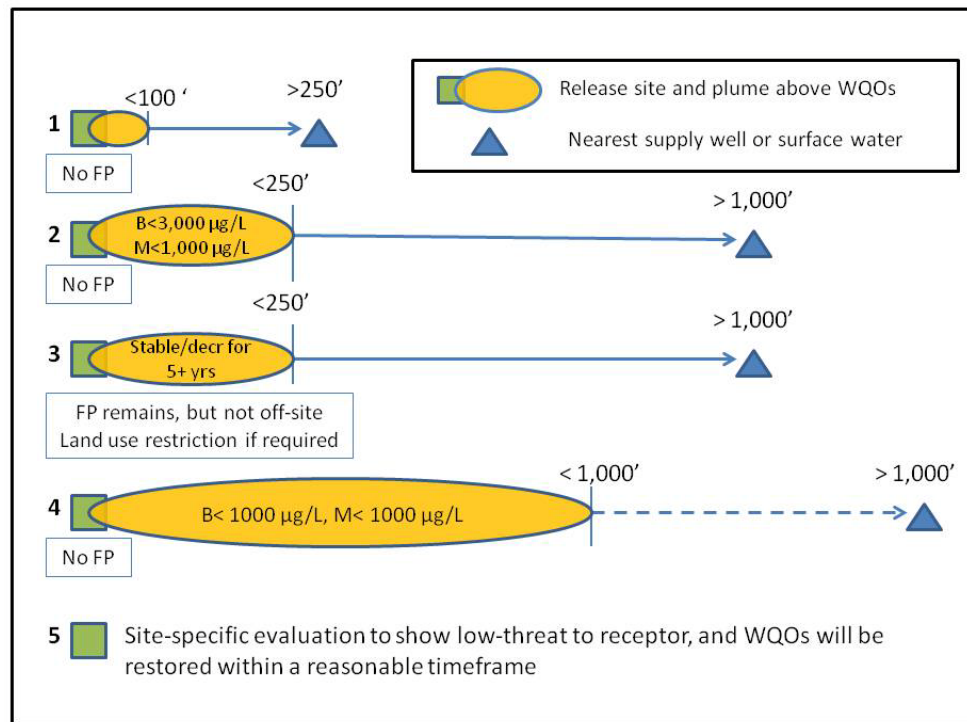


- Step by step discussion of the Policy criteria
- If one of the pathway criteria is not met under the Policy, a site specific evaluation for that pathway can be performed

Risk Evaluation and Management



Groundwater Plume Classes for Policy



Green & Environmentally Responsible Cleanups

- Becoming more of a priority for the State and Fund
- ustcalc.org : Calculates carbon footprint for 5 common remedial actions

LEAKING UST Footprint Calculator BETA

September 12, 2012

BACKGROUND ASSUMPTIONS TECH SCENARIOS PARAMETERS CALCULATIONS

Profile General Excavation SVE P & T MPE MNA Results

Scenario

Please click on the question mark to review technology scenario descriptions. Optional: select the scenario that best applies to your site and click Apply to overlay the standard defaults with the scenario defaults.

Technology Scenario: None Selected Apply ?

Help us understand who is using the calculator by filling out information about yourself. It is optional and we appreciate any information you can provide.

User Type: Consultant

Name:

Phone:

Email:

Zip Code:

How to Use the Calculator:
Use Next/Prev to navigate through all screens. Navigating with Tabs will allow you to focus on only the technologies you want to consider. The Design Link contains questions that do not have a large impact on the output. To save time, it is skipped when navigating with the Next/Prev buttons. Click the Design Link to navigate to the Design questions.

Question Mark buttons will give you helpful hints. Click on the small clouds throughout the calculator to view calculations.

Next

LIVE Results			Short-tons CO2 eq.
Excavation	4.5	days	11.6
SVE	3.0	years	171.4
P&T	6.0	years	818.1
MPE	3.0	years	438.1
MNA	3.0	years	9.0

Next Steps

“Evergreen”

- **Regularly updated**

Training:

- **Meetings?**
- **Podcasts?**
- **Live Web Meetings?**

Your Input



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